

## Interorganisational Matters



### Report on CEOS CAL/VAL Working Group Terrain Mapping Subgroup

*Calibration/Validation Working Group*

*By Ian Dowman, Chair, Terrain Mapping Subgroup*

The working group of CEOS on calibration and validation (CEOSWGCV) met in Gaithersberg, Maryland, USA on 25th - 27th October. The WGCV plenary was preceded on 23rd and 24th October by a meeting of the Terrain Mapping Sub group. WGCV is made up of representatives from the members of CEOS who are concerned with calibration and validation of sensors and products from Earth observing satellites. There are currently four sub groups: SAR, Microwave, Infrared and Visible Optical Sensors and Terrain Mapping, a fifth group: Land Product Validation is being proposed to the next CEOS Plenary. The WGCV Plenary received reports from the sub groups and had a major discussion on the tracability of EO products to SI units. The meeting also endorsed increased collaboration with ISPRS and the involvement in the new working groups being set up for the next four years.

#### Terrain Mapping Subgroup

The subgroup with activities most closely related to ISPRS is the Terrain Mapping Subgroup which has the mission: 'To ensure that characteristics of digital terrain models produced from Earth Observation sensors at global and regional scale are well understood and that products are validated and used for appropriate applications'.

The activities of the subgroup during the past year have concentrated on keeping abreast of current sensor development and validation activities. There has also been collaboration with ISPRS to produce a book on global data sets.

Two important sensors have been launched during the past year. The first was the Shuttle Radar Topography Mission which successfully collected interferometric SAR data over the whole of the Earth's land surface between 60°N and 56° South. This data is now being processed to produce a Digital Elevation Model (DEM) with 1" spacing and accuracy of  $\pm 16m$ . The validation of this data is particularly important to the sub group, because of the immense value of the dataset and the problems posed in processing such a large data set to such high accuracy. The other sensor of interest is Aster on the Terra satellite, producing optical stereoscopic data. The commercial IKONOS sensor is also of interest to the group. A number of other sensors are being constructed, these include the Vegetation Canopy Lidar (VCL), ICESat and airborne sensors such as GeoSAR which will be valuable for validation of satellite products. The workshop meeting was attended by 13 people repre-

senting many of the US agencies involved in generation and validation of DEMs. The new developments were discussed and the following issues were highlighted.

#### Specification of accuracy

A single figure is not adequate to specify accuracy over a heterogeneous area. Segmentation of the image would enable accuracy to be attributed to areas with different topography or landcover, but this information involves additional work and the information may not be available. There is a significant problem in knowing the accuracy of the reference data and the only data available may be worse than the new product. The presentation of data on accuracy and reliability was also discussed and it was agreed that visualisation of these parameters can greatly help understand the data. USGS demonstrated very good practice in generating accuracy data and presenting source information but this was given as text.

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### Test sites

The Terrain Mapping sub group produced a directory of test sites suitable for validating DEMs with accuracy in the 5-20m range, generated from sensors such as SPOT and ERS tandem data. These are not suitable for validating high resolution terrain information (HRTI) as much work is being done now with reference data generated from airborne IfSAR and LIDAR sensors. Test sites are now required which give high accuracy and which are covered by data from airborne sensors. Several sites were identified:

- Morrison, Colorado established by USGS.
- Kaintuck Hollow, Missouri, established by USGS.
- Nevada, DoD/DoE
- Costa Rica, established for VCL

Data from all of these is, or is expected to be, available for general use. It was recommended that the TM group should update the data base of test sites and use a format which is compatible with terrain information.

It was also recognised that there is a serious problem when validating DEMs in dealing with surface features. Traditionally a 'bald earth' DEM has been produced but optical sensors produce 'digital surface models (DSMs)' or reflective surfaces. IfSAR DEMs will include buildings but will penetrate the vegetation canopy to largely unknown amount. LIDAR on the other hand will produce both canopy and ground level. Processing algorithms will produce bald earth DEMs but often the reliability of these is unknown as assumptions are made about the height of the canopy and the surface beneath. Much more needs to be known about these processes.

There is a requirement for validation data beyond high resolution DEMs when validating global or continental data sets. Experience has been gained with using discrete check points, profiles collected by Kinematic Differential GPS, plane surfaces such as airports and sea surface. It was noted that a fully validated coastline would be very useful for future validation.

### Other issues

A number of other issues were discussed:

A standard format for sensor parameters should be established. The SPICE format used for extra terrestrial missions was a good example of what is needed for Earth observing systems.

CEOS should promote the use of validation data sets and provide information on those which exist.

### Conclusion

There are clearly many activities of the Terrain Mapping Subgroup which overlap with the interests of ISPRS Working Groups. There are also overlaps in the area of sensor calibration and validation of land surface products. It is to be hoped that the new generation of ISPRS Commission Presidents and Working Group Chairs will make themselves more familiar with CEOS activities and that increased collaboration will result during the next four years.

Further information can be found on the CEOS website: [www.ceos.org](http://www.ceos.org)

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## FIG Annual Report Available

By *Markku Villikka, Director FIG Office*

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The FIG Annual Review 1999 and the FIG Bulletin 71 are ready and can be found on the FIG web site: [www.fig.net](http://www.fig.net).

The Annual Review 1999 can be seen already now on the FIG web site and can also be downloaded as a pdf-file. The address is: [www.fig.net/figtree/annual-review/anrew99/anrev99.htm](http://www.fig.net/figtree/annual-review/anrew99/anrev99.htm)

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